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The representation of bibliographic families in library data models and their preservation in mappings: The case of the mapping from FRBR to BIBFRAME

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1 Introduction

The navigation in an ever-changing overloaded bibliographic universe that preserves the contextual semantics of the bibliographic descriptions largely depends on the control of content relationships and *bibliographic families*. According to Tillett [1] *content relationships* exist between different bibliographic entities and can be considered as a sequence of intellectual/artistic content; as this continuum gets distant from the original progenitor, the relationship becomes remote. The term *bibliographic family* is defined as 'a set of related bibliographic works that are somehow derived from a common progenitor' [2]. Library conceptual models include constructs to describe and control *relationships* and *bibliographic families.* The identification of *bibliographic families* and the clustering of all related entities shall enable future library catalogs' navigation functionalities. The preservation of *bibliographic families* maintains the information that two or more *Works* originate from a common progenitor. Hence, successful mappings between different conceptual models presuppose the preservation of content relationships and *bibliographic families* after data transformation [3–5].

This paper is based on [6] and examines if and how information about content relationships and *bibliographic families* may be preserved in mappings from FRBR to BIBFRAME. The cases of a *Work* with a single *Expression*, as well as *bibliographic family* cases e.g. *Work* with multiple *Expressions and Works* with derivative relationships are studied and some interesting findings have been derived.

2 Mapping content relationships and *bibliographic families*

2.1. Work with a single Expression

The simplest and the most frequent bibliographic case [7] is a *Work* with a single *Expression* and a single *Manifestation*, e.g. a monograph (book) in a language. The mapping for this case seems straightforward (Figure 1). The FRBR path *Work-is realized through-Expression* is mapped to the *bf:Work* class, while the rest constructs of the path are mapped 1:1. More precise mappings may be developed for each of the 10 subclasses of the BIBFRAME *Creative Work* class and for the 5 subclasses of the *bf:Instance* class.

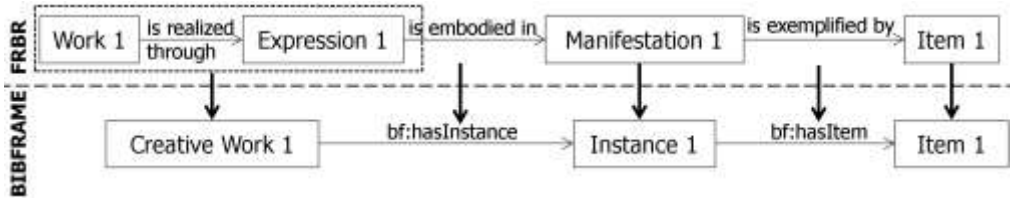

Fig. 1. Mapping from FRBR to BIBFRAME *representation pattern* for a *Work* with a single *Expression*.

The exploitation of (a) the attributes of the FRBR *Expression* and *Manifestation* entities and (b) controlled vocabularies from the Library of Congress Linked Data Service or ISBD vocabularies to specify the values of the attributes improve significantly the semantic precision of the mapping rules. For instance at the *Expression* level, we have identified the *form of expression* attribute and we used the LC Content Types Scheme for its values to enable precise mappings for

all *bf:Work* subclasses. In some cases these values may even determine the mapping to a *bf:Instance* subclass (see Figure 2). Furthermore, at the *Manifestation* level, we have identified the *form of carrier* attribute and used the LC Carriers Scheme.

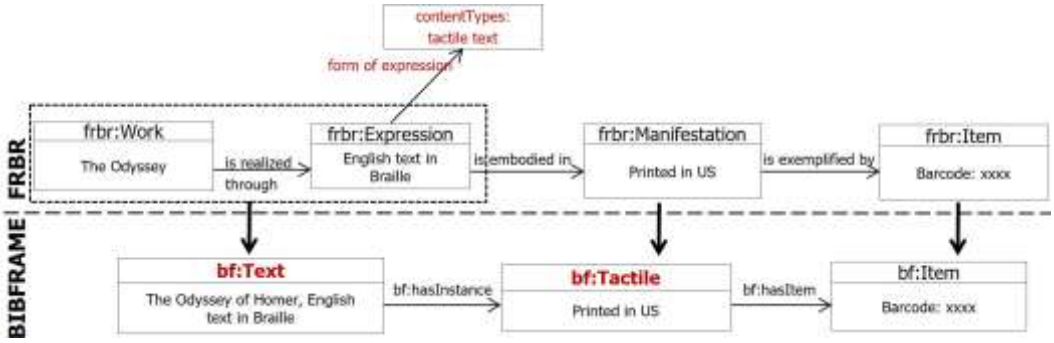

Fig. 2. Mapping from FRBR to BIBFRAME a detailed *representation pattern* for a *Work* with a single *Expression*. The path *Expression-form of expression-contentTypes: tactile text* triggers mapping to *bf:Work* and *bf:Instance* subclasses.

The utilization of controlled vocabularies for interoperability reasons demands both their multilingualism and their representation in RDF. Therefore, cataloging should be performed taking into account the collaboration and data reusability principles.

2.2. Work with multiple Expressions

In the case of mappings from an FRBR *Work with multiple Expressions* to BIBFRAME, two instances of the *bf:Work* class are generated. However the semantics regarding the origination of the two instances of the *bf:Work* class from the same *Work* (intellectual idea) are lost (Figure 3).

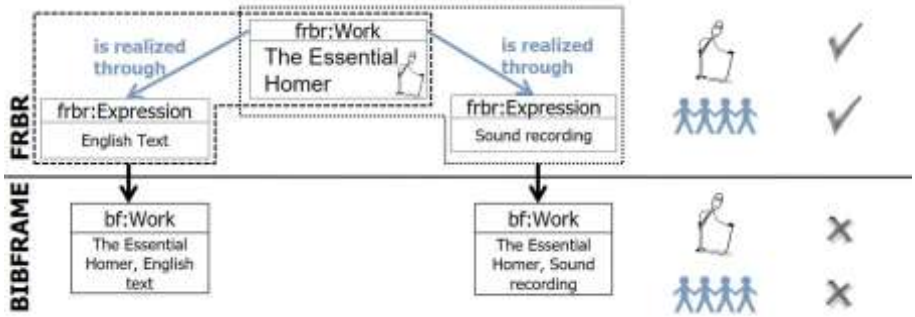

Fig. 3. Mapping from FRBR to BIBFRAME *representation pattern* for a *Work* with a single *Expression*. After mapping, both progenitor and bibliographic relationship are lost.

2.3. Derivation - translation

Literal translation is represented in FRBR by relating two or more *Expressions* of the same *Work* with the *has translation* relationship (upper part of Figure 4). After mapping to BIBFRAME, the content relationship between the two *Expressions* is preserved in the two *bf:Works*. The information that the *bf:Work* instances have the same progenitor (*Work*) is not preserved though (Figure 4).

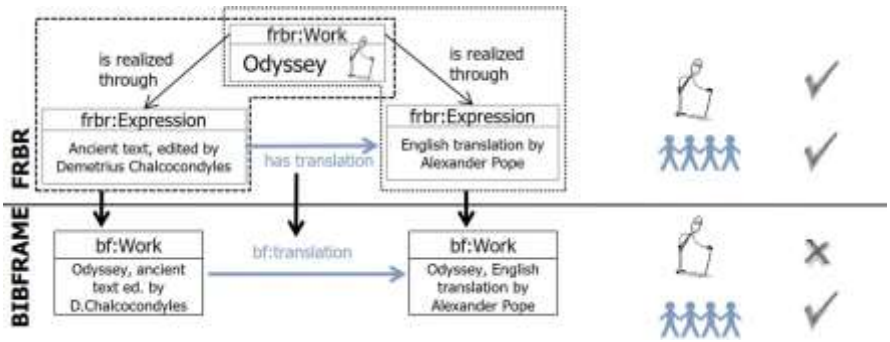

Fig. 4. Mapping from FRBR to BIBFRAME *representation pattern* for the translation case.

In order to preserve information about the common progenitor, an additional *Expression*-agnostic *bf:Work* instance will be created (*bf:Work* with the long dash-dot outline in Figure 5). Then this additional *bf:Work* instance will be linked with the others *bf:Work* instances using the *bf:hasExpression* property (also depicted with a long dash-dot line). This *Expression*-agnostic *bf:Work* cannot have any bf:Instances but it can serve as a the progenitor for all *bf:Works* that somehow derive from it.

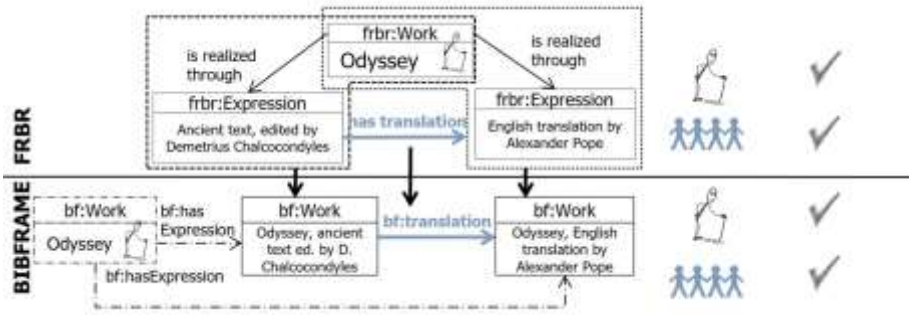

Fig. 5. Mapping from FRBR to BIBFRAME *representation pattern* for the translation case. The *bf:Work* with the long dash-dot outline has been added in the mapping to preserve the progenitor *bf:Work* of the *Odyssey bibliographic family.*

Adaptation is represented in FRBR, either between *Works*, or between *Expressions* of different *Works.* This case demonstrated similar results with the translation case: content relationships are preserved, the progenitor is lost and the addition of *Expression*-agnostic *bf:Work* preserves information about the bibliographic family.

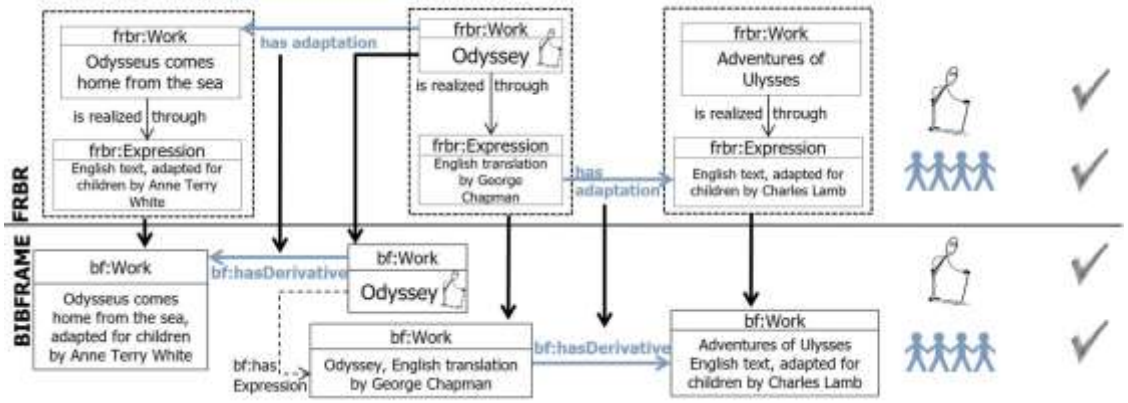

Fig. 6. Mapping from FRBR to BIBFRAME *representation pattern* for the adaptation case. The *Expression*-agnostic *bf:Work* serves as the progenitor *bf:Work* of the *Odyssey bibliographic family.*

3 Conclusions

One key finding has been that relationships between members of a *bibliographic family* are preserved in BIBFRAME when FRBR *Expressions* are related. Moreover, the progenitor *Work* is not always represented in BIBFRAME after mappings.

This study uses a limited set of cases and data. A follow-up study shall use a bigger dataset and test more cases; it will also compare the transformation using existing transformation tools to evaluate their degree of preservation of bibliographic relationships after mappings. Interesting findings are also anticipated for testing IFLA LRM to BIBFRAME and the opposite mappings.

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